

## Reproductive Behavior and Parental Care in Little Brown Dove, *Streptopelia senegalensis* During COVID-19 Lockdown Period in Prayagraj (Allahabad) UP, India

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**Abstract:** This is a case study of reproductive behavior and parental care in Little brown dove, *Streptopelia senegalensis* ( family Columbidae ) during COVID-19 lockdown period (April to June 2020) in the urban area of Prayagraj (Allahabad) Uttar Pradesh, India. The nest was built in crevices made up of red bricks that bland with dove's coloration. Thus little brown dove probably uses camouflage as a protective measure. Male courtship display shows head bobbing and displacement preening. Both sexes preen each other during courtship. Two bright white eggs similar in shape and size 2.8cm (Length) × 2.1 cm (Breadth) are laid that take about 11 days to complete incubation. Hatchlings are altricial in nature having dark brown-black skin and blunt bills. Both individuals take part in nest building, incubation and feeding the nestlings. Adults work in shift while incubating the eggs and feeding young. Little brown dove may leave the eggs or nestlings unguarded whenever required. Parents assist fledglings in-flight learning. Adults observed to shed broken feathers during distraction display that need further study to confirm.

**Key words:** Head Bobbing Display • Displacement Preening • Distraction Display • Shifting • Camouflage

### INTRODUCTION

Little Brown Dove, *Streptopelia senegalensis* (Linnaeus, 1766) belongs to family Columbidae of order Columbiforms is a long-tailed dove found in Africa, the Middle East and Indian subcontinent. In India, it is generally called the 'Little brown Dove'. It is widespread in scrubs, farmland and areas of human settlements. It is usually seen in pairs or small parties and eats fallen seeds of grasses, vegetables and small ground insects such as termites and beetles. Little brown dove generally breeds throughout the year chiefly January to October, [1]. The nest is very thin made up of soft, semi-dried thin grass sticks, wood sticks and plastic wires [2]. Nest building sites include shrubs [2] or verandah of the house [3-4]. Ground nesting has also been reported in little brown dove [5]. Both adults are involved actively in nest building, incubation and feeding young. Patil and Shende [2] reported that males do not take part in nest building. Male courtship displays include head bobbing and displacement preening, female accepts by crouching and begging food [6]. Eggs are incubated only after the

second egg is laid. Eggs take about seven to fifteen days to hatch [1-3]. Distraction displays have been observed by adults to attract the attention of an enemy away from the nest or young [7]. Multiple brooding in little brown dove has been noted by George [4]. The same nest may be reused by building a new nest just above the existing one [3].

The present description is a case study regarding the reproductive behavior of little brown dove in urban habitat during the COVID-19 lockdown period describing courtship, nest building, incubation, hatching, feeding young, protection strategies and some aspect of flight learning. The present study will add information about the reproductive behavior and parental care of little brown dove.

### MATERIALS AND METHODS

Little Brown Dove, *Streptopelia senegalensis* (Linnaeus, 1766) belongs to family Columbidae of order Columbiforms is a long-tailed slim pigeon. It is a case study that deals with direct field observation on

reproductive behavior and parental care of this bird. The study carried out from 28<sup>th</sup> April 2020 to 9<sup>th</sup> June 2020 during the COVID-19 lockdown period. The observation site was located in an urban area situated in city Prayagraj (Allahabad) Uttar Pradesh, India (25°30' 31" N, 81°51'42" E). The area was heavily populous with human settlements with little scattered vegetation (Trees, shrubs, some flowers and vegetables in pots). Site was about

300 m away from river Ganga. Observations carried out during day and night with possible caution not to disturb birds, eggs and nestlings. Behavioral activities observed and recorded date wise in a diary. Photographs and videos were taken by Lenovo vibe mobile (model no. A7020a48). Temperature and humidity were maintained using a mobile application named 'Weather' (version V 1.1.1.).

### Observation:

Table 1: Date wise important events observed regarding the reproductive behavior of Little brown dove, *Streptopelia senegalensis*

| S.N. | Date (s)  | Temperature Range (°C) | Humidity Range (%) | Observation  |
|------|---|------------------------|--------------------|--|
| 01.  | 28 <sup>th</sup> to 30 <sup>th</sup> April 2020 | 24-36                  | 35-75              | A pair of Little brown Dove was observed in courtship behavior. One following the other with head bobbing and cooing. They noticed to preen each other. One of them pecked its folded wings showing displacement preening to solicit copulation.   |
| 02.  | 1 <sup>st</sup> to 4 <sup>th</sup> May 2020     | 24-37                  | 32-75              | Pair was observed many times during the day following each other with cooing. They also have shown standing side by side. Single dove was observed standing beside a water source.   |
| 03.  | 5 <sup>th</sup> to 6 <sup>th</sup> May 2020     | 25-39                  | 30-80              | Both individuals were actively engaged in nest construction. One of them was bringing material for nest building while other places them properly. Nest construction observed only during the morning and once in the evening.   |
| 04.  | 7 <sup>th</sup> May 2020                        | 24-38                  | 28-79              | Nest construction was continued in the morning. One egg was laid in the evening. After laying the egg, the female left the nest, leaving egg unguarded overnight.  |
| 05.  | 8 <sup>th</sup> May 2020                        | 26-40                  | 23-76              | The egg was still unguarded in the morning. Another egg was laid afternoon. Dove now started incubation.   |
| 06.  | 9 <sup>th</sup> to 17 <sup>th</sup> May 2020    | 28-42                  | 12-74              | Parents observed to take part in incubation. Both working in a shift of a few hours. Shifting occurred only during day time. Individual who took charge in the last shifting incubate overnight. Two to four shifting events noticed during a day. Dove observed to leave the nest in the evening for hours. Adults were maintaining nest by placing more nest-building materials. |
| 07.  | 18 <sup>th</sup> May 2020                       | 26-43                  | 15-65              | One egg hatched in the morning. The hatchling was stacked firmly to the belly.   |
| 08.  | 19 <sup>th</sup> May 2020                       | 28-43                  | 09-69              | One another pair of Little-brown dove was observed in courtship in the morning. The second egg hatched in the evening.   |
| 09.  | 20 <sup>th</sup> to 29 <sup>th</sup> May 2020   | 28-47                  | 12-69              | Parents actively fed and guarded nestlings. Periodical shifting occurred in the same manner as during incubation. Nestlings grew rapidly. Two to three days before fledging they lived unguarded during daytime except at the time of feeding. During this period they were unprotected overnight.   |
| 10.  | 30 <sup>th</sup> May 2020                       | 30-46                  | 07-70              | One nestling fledged and left nest in the morning and the other one in the afternoon. Some feathers were observed scattered on the ground. A flock of House crow ( <i>Corvus splendens</i> ) has seen hovering above the nest. One fledgling noticed to perch on a wire overnight.   |
| 11.  | 31 <sup>st</sup> May 2020                       | 26-41                  | 52-95              | One fledgling was observed to learn flight with the help of parents. Learning involves feeding, preening and cooing by parents. Adults were hovering nearby during the learning process.   |
| 12.  | 1 <sup>st</sup> to 5 <sup>th</sup> June 2020    | 27-43                  | 40-92              | One pair of Little brown dove was observed to preen each other. It is probably one that was seen on 19 <sup>th</sup> May 2020.   |
| 12.  | 6 <sup>th</sup> June 2020                       | 27-42                  | 50-82              | In the morning nest building was observed just above the existing nest that was full of excreta. In the afternoon one egg was laid by female, which left unprotected.  |
| 13.  | 7 <sup>th</sup> June 2020                       | 28-39                  | 52-94              | Nest building still continued in the morning. The egg was unguarded.   |
| 14.  | 8 <sup>th</sup> June 2020                       | 28-40                  | 45-80              | The second egg was laid in the early morning and incubation started.   |
| 15.  | 9 <sup>th</sup> June 2020                       | 27-39                  | 50-90              | A flock of house crow observed hovering above the nest in the early morning. Both eggs were taken away by adults in the late morning.  |

A pair of Little brown dove, *Streptopelia senegalensis* was seen in courtship behavior. The male was following female with head-bobbing display with cooing (Fig. 1). Pairs were found to preen each other (Fig. 2). Male packed its folded wings to solicit copulation by female thus showed displacement preening (Fig. 3). One individual was observed to stand beside a water source (Fig. 4). In the following days, they were seen flying together here and there while cooing.

They started nest construction in the crevice made up of red bricks under the eaves about 1.7 m above the surface. The color of bricks and nest-building materials blends with dove's body color created some camouflage. Both individuals took part in nest construction actively. One individual bringing materials and other places them properly (Fig. 5). Nest made up of materials like grass sticks, soft twigs, tendrils in dried condition and few thin plastic wires. No fresh green materials were utilized in nest construction (Fig. 6). The nest was not protected by any means and laid open enough to be attacked or destroyed by predators. The diameter of the nest was about 0.10 m hence very thin and flimsy. Nest building took place only during day time, mostly in the morning and once in the evening. It took two and a half days to complete when newly constructed and a day when a new pair utilized the same nest. Only a few twigs were added by new pair in their turn (Fig. 14). Furthermore, adults also placed more twigs in the nest before hatching.

The first egg was laid in the evening after the completion of the nest building and the female left the egg unguarded. It was just after second egg-laying that dove started incubation (Fig. 6). The dimensions of both eggs were 2.7 cm (length) × 2.2 cm (breadth). Parents contributed incubation periodically through shifting. Shifting occurred three to four times only during day time. Shifting did not noticed in the night; one who took charge at last shifting guarded the nest overnight. Individuals who arrived for shifting either land directly inside the nest or waited for a time outside the nest. Instances were noticed when adults arrived for shifting but flew away. Both individuals observed to cooing before and after shifting. It was noticed that departed one looking towards the nest and flying mostly nearby. Adults observed to communicate regularly with each other both visually and vocally. For this purpose departed one mostly sits on the top of structures in the orientation it could surveillance the nest site easily. Although parents were very alert and sincere in their task, yet they left the eggs unguarded for

hours in the evening possibly for foraging. Adults hold eggs either inside the wing or underbelly. Incubation lasts 10-11 days and eggs hatched in consecutive days. Hatching possibly involved breaking eggshell by adults because it was observed that broken shell has serrated margin directed inwardly. Eggs were broken medially along the equator (Fig. 7). At the time of shifting half of the egg shell fallen accidentally that never lifted again by the adults. The rest of the eggshells were thrown away distantly by parents. Hatchlings were helpless and eyes were closed i.e. altricial in nature.

Nestlings were guarded and faded by parents periodically through shifting. Nestlings either sucked crop milk or swallowed dough food by inserting its blunt beak inside the bill of adults (Fig. 10). Nestlings mostly feed simultaneously. Nestlings grew very rapidly. Adults accommodate them in body, one behind wing or belly and other toward vent (Fig. 8). Nestlings changed their position several times in a day (Fig. 9). At the time of shifting, adults accommodated very carefully that took a few minutes before sit comfortably. It was seen that nestlings were alone in the day and were unguarded overnight two to three days before fledging. Adults just came to feeding, spend some time and flew away.

One nestling fledged and left the nest in early morning and second in the afternoon on the same day. A flock of house crow (*Corvus splendens*) was noticed hovering over the nest in the early morning. Broken feathers of adults were scattered on the floor (Fig. 11). It was probably the sign of distraction display by adults to protect fledglings. Fledgling that left the nest in the afternoon seen to perched overnight (Fig. 12). The next morning both adults were seen to assist flight learning by fledglings (Fig. 13). It was achieved by feeding, preening and cooing. Furthermore, adults flying side by side together with fledglings. Both parents and young flew away in the late morning.

About five days later another pair of Little brown dove occupied the same nest and constructed one new nest just above the existing one by using little twigs. In the afternoon one egg was laid and left unguarded. Dove continued nest-building in next morning. The second egg was laid in the early morning and incubation started (Fig. 15). A flock of house crow again noticed hovering over the nest. One house crow swooped towards eggs (Fig. 16). The sitting dove left the nest at once and returned only after it made confirm that there is no threat. Dove left the nest with eggs two hours later and never seen again.



Fig. 1: Male Little brown dove showing head bobbing with cooing to female



Fig. 2: Male and female Little brown dove preening each other



Fig. 3: Male Little brown dove pecking its folded wings showing displacement preening



Fig. 4: Female Little brown dove near a water source for washing her vent



Fig. 5: The act of nest building by Little brown dove



Fig. 6: The nest of Little brown dove showing nesting materials and eggs



Fig. 7: Broken eggshell of Little brown dove showing serrated margin directed inwardly



Fig. 8: Adult Little brown dove showing accommodation of nestlings in its body



Fig. 9: Nestlings of Little brown dove showing change in orientation



Fig. 10: Adult Little brown dove feeding nestlings



Fig. 11: Broken wings of adult Little brown dove possibly outcome of distraction display



Fig. 12: Fledgling perching on a rope



Fig. 13: Adults Little brown dove assisting flight learning



Fig. 14: Newly constructed nest made up of few twigs on the preexisting nest



Fig. 15: Female little brown dove at the time of egg laying



Fig. 16: House crow swooping toward nest of Little brown dove

## DISCUSSION

A pair of little brown dove was observed to engage in breeding and subsequent parental care during period 28<sup>th</sup> April to 31<sup>st</sup> May 2020 with success. Five days later another pair of Little brown dove seen to manage to construct nest just above the existing one and laid a pair of eggs but unfortunately, left the place along with eggs. Ali and Ripley [1] reported that breeding season is not defined in little brown dove. It usually breeds from January to November. Breeding in little brown dove was observed in March- April by Patil and Shende [2] and during January – February by Nene [3]. According to George [4] and Nene [3], the same nest may be utilized

again for breeding purposes after new nest construction just above the existing one. Likewise in the present study, it is noticed that a new pair of dove occupied the same nest for construction of a new nest just above the previous one. In the present study, the nest site lies in the human settlement as also reported previously by Nene [3] and George [4]. The nest was built in crevices made up of red bricks under eaves about 1.70 m above from floor. The nesting site was open enough to be destroyed by predators or even by the observer. The site probably was chosen because brick's color blends with dove's coloration. The first time when the dove was observed in the nest and observer came closer, it flew away nearby and returned only after it realized that there is no harm.



Later, many times observer came closer, but never left the nest. I never disturbed nor swooped over it. The reason for this ignorance is not clear, perhaps it habituated. Nene [3] and George [4] reported nesting in the verandah. When a new pair of a Little brown dove was engaged in nest construction at the same site a crow swooped toward it, dove escaped but did not leave the nest site permanently. But when crow swooped toward nest again during incubation, dove left the nest after some time permanently along with eggs. The Doves left the nest unguarded overnight and returned the next morning when disturbed at night [3]. What is the reason of this contrasting behavior toward crow and human need further study. During courtship, the male was observed to follow female with head-bobbing with cooing. Pair was found to preening each other. Male pecked its folded wings to solicit copulation and thus displacement preening. Biricik *et al.* [6] described head-bobbing and displacement preening in little brown dove in their study. Both individuals took part in nest construction. The nest was observed to build of grass sticks, softwood sticks, tendrils and some plastic wires. One individual bringing material for nest construction and others place them properly. Nene [3] and George [4] reported that both adults take part in nest building. Biricik *et al.* [8] described that male brings the nesting materials which are then placed properly by female. The present finding is in pace with these previous observations. In contrary to this Patil and Shende [2] noticed that only females take part in nest construction. In present study, it is observed that nest building also took place after egg laying and before hatching. Probably it is maintenance if some damage has occurred or some deficit in nest quality that should be overcome.

Incubation started just after second egg-laying. Although adults were observed to visit nest having single egg, possibly to see if the egg is safe. Incubation carried out actively by parents with periodical shifting. Shifting occurred only during day time. Two to four shifting events have been observed in a day. The individual, who took charge at last shifting, took care of the nest overnight. No sex differentiation could be achieved during incubation and feeding. Parents were alert and sincere during incubation and hardly left the nest. Two times they were observed to leave the nest unguarded for hours in the evening probably for foraging or some other reasons. During shifting, an arriving dove landed inside the nest directly or waited for a time adjacent to the nest. Eggs were hidden inside wings or

belly and kept in a position very carefully at the time of shifting. Adults were aware of any happenings nearby and always tracking objects moving around. During incubation, adults changed their orientation and of course eggs accordingly. Before and after the time of shifting, both adults were observed to communicate with each other by cooing. The departed dove surveillance nest visually either by flying nearby or sitting distantly oriented toward the nest. Patil and Shende [2] reported that only female dove incubate the eggs. It regularly changed her orientation and position of the egg. Nene [3] and George [4] reported that both male and female incubate the eggs. The present study is consistent with these previous findings. George [4] noticed that during incubation eggs were never left unguarded except at the time of shifting while Patil and Shende [2] observed that females left the eggs unguarded in the morning and evening for few minutes. In the present study, it was observed that adults left the nest in the evening for hours possibly for foraging or reason unknown. George [4] confirmed by marking individuals that female dove incubates the eggs during night and male during the day. In the present study, siftings were observed during day time that means that both males and females are involved in incubation during the day.

After completion of incubation, hatchlings came out from egg by breaking the egg by adults. Hatchlings were naked, blind, helpless and solely depended on parents so atrecial type. They were faded by parents. They sucked crop milk and inserted blunt beak inside the bill of parents to feed on dough food materials. Patil and Shende [2] reported similar method of feeding although they said that only female feeds the nestlings. Biricik *et al.* [8] reported that parents feeding the nestlings. Parents seemed less careful as nestlings became quite large. It was seen two to three days before fledging that adults came to nest only for feeding and the nestlings were alone rest of day time. Furthermore, nestlings were left unguarded overnight during these days.

Nestlings left the nest on the same day, one in the morning and another in the afternoon. Some feathers that were scattered on the floor probably were the outcome of distraction display. Mankadan [7] observed distraction display in the little brown dove with flapping wing feigning injury, although broken feathers were not noticed. Further study is needed to confirm whether feathers are broken during distraction display. Both parents were observed to assist flight learning to fledglings by preening, cooing and hovering nearby.

It was observed that a new pair of little brown dove occupied the same nest by making a new nest with the use of few twigs just above the existing one. George [4] described that little nest material is utilized when an old nest is reused. Furthermore multiple brooding by little brown dove using the same nest, again and again, was noticed by George [4]. Pair of eggs was laid and incubation started, but dove left the nest along with eggs because of the chance to get predated by house crow. Similar incidence has been reported by Patil and Shende [2] where little brown dove moved the nestlings to a safer place to avoid danger by Greater coucal (*Centropus sinensis*).

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